

### Listing of Claims

This listing of claims will replace all prior versions and listings of claims in the application:

#### Claims 1-15 (Canceled)

16. **(Withdrawn)** A method for increasing the signal-to-noise ratio in the characteristic optical response of an array having subpopulations of sensor elements comprising:

- a) providing an array comprising:
  - i) at least a first subpopulation comprising first sensor elements; and
  - ii) a second subpopulation comprising second sensor elements;
- b) contacting said array with a composition comprising at least a first target analyte;
- c) obtaining a first measurement from at least two of said sensor elements of at least one of said subpopulations;
- d) summing said first measurements from said sensor elements; and
- e) performing a statistical analysis on said first measurements.

17. **(Withdrawn)** The method according to claim 16 further comprising obtaining at least a first control measurement and adjusting the baseline of said first measurement against said first control measurement.

18. **(Withdrawn)** The method according to claim 16 wherein the signal-to-noise ratio is increased by a factor of at least 10.

Filing Date: April 6, 1999

19. **(Withdrawn)** The method of claim 16 wherein an analyte detection limit is reduced by a factor of at least 100.

20. **(Currently amended)** The method of claim [[16 or]] 27, wherein said sensor elements are beads and said array comprises a population of beads dispersed on a substrate.

21. **(Original)** The method of claim 20 wherein said substrate is a fiber optic bundle.

22. **(Original)** The method of claim 20 further comprising identifying the location of each sensor element within each sensor subpopulation within the array.

23. **(Withdrawn)** The method according to claim 16 wherein said sensor elements comprise chemical functional groups.

24. **(Withdrawn)** The method according to claim 16 wherein said sensor elements comprise oligonucleotides.

25. **(Withdrawn)** A method for amplifying the characteristic optical response of an array having subpopulations of sensor elements comprising:

- a) providing an array comprising:
  - i) at least a first subpopulation comprising first sensor elements; and
  - ii) a second subpopulation comprising second sensor elements;
- b) contacting said array with a composition comprising at least a first target

analyte;

c) obtaining a first measurement from at least two of said sensor elements of at least one of said subpopulations; and

d) summing the optical responses.

26. **(Withdrawn)** A method according to claim 25 further comprising obtaining at least a first control measurement and adjusting the baseline of said first measurement using said first control measurement.

27. **(Currently amended)** A method comprising:

a) providing an array with a plurality of subpopulations of sensor elements, wherein subpopulations comprise identical sensor elements;

b) contacting said array with a composition comprising at least a first target analyte;

c) obtaining ~~first and second~~ measurements from ~~at least first and second~~ said identical sensor elements, ~~respectively,~~ from at least a first of said plurality of subpopulations; and

d) performing a statistical analysis on said ~~first and second~~ measurements from said first of said plurality of subpopulations, whereby statistical validity of said measurements from said identical sensor elements is determined.

28. **(Currently amended)** The method according to claim [[16 or]] 27, wherein each subpopulation comprises a bioactive agent.

29. **(Original)** The method according to claim 28, wherein at least one of said bioactive agents is a nucleic acid.

30. **(Original)** The method according to claim 28, wherein at least one of said bioactive agents is a protein.
31. **(Previously presented)** The method according to claim 20, further comprising determining outlying beads and excluding outlying beads from said subpopulation.
32. **(Currently amended)** The method according to claim ~~16, 45 or~~ 27, wherein said statistical analysis comprises calculating the mean of at least said first and second measurements.
33. **(Currently amended)** The method according to claim ~~16, 45 or~~ 27, wherein said statistical analysis comprises calculating the standard deviation of at least said first and second measurements.
34. **(Currently amended)** The method according to claim ~~[[16 or]]~~ 27, further comprising evaluating the statistical validity of said measurements.
35. **(Currently amended)** The method according to claim ~~[[16 or]]~~ 27, further comprising performing a second statistical analysis on said measurements.
36. **(Original)** The method according to claim 35 wherein said second statistical analysis comprises evaluating said measurements using confidence intervals.

37. **(Original)** The method according claim 35, wherein said second statistical analysis comprises using said measurements to perform hypothesis testing.

38. **(Currently amended)** The method according to claim [[16 or]] 27, further comprising comparing said statistical analysis of measurements obtained from at least two subpopulations.

39. **(Currently amended)** The method according to claim 38, wherein said statistical analysis comprises performing a cluster analysis of measurements from each of said subpopulations.

40. **(Withdrawn)** A method comprising:

- a) providing an array comprising beads on a substrate comprising a plurality of subpopulations of sensor elements, wherein each sensor element comprises a bioactive agent that will bind a target analyte, and at least two of said subpopulations comprise different bioactive agents that will bind the same target analyte;
- b) contacting said array with a composition comprising at least a first target analyte;
- c) obtaining a measurement from the optical response of each sensor element; and
- d) performing a statistical analysis on said measurements from each sensor element.

41. **(Withdrawn)** The method according to claim 40, wherein at least two of said subpopulations each comprise bioactive agents that will bind different target analytes.

42. **(Withdrawn)** The method according to claim 41, wherein at least one of said bioactive agents is a nucleic acid.
43. **(Withdrawn)** The method according to claim 41, wherein at least one of said bioactive agents is a protein.
44. **(Withdrawn)** The method according to claim 40, further comprising, determining outlying beads and excluding outlying beads from said subpopulation.
45. **(Withdrawn)** The method according to claim 25, further comprising:  
e) performing a statistical analysis on said measurements of at least one of said subpopulations.
46. **(Currently amended)** The method according to claim [[16,]] 27 [[or 40]], wherein said substrate is selected from the group consisting of glass and plastic.
47. **(Previously presented)** The method according to claim 20, wherein said substrate is selected from the group consisting of glass and plastic.
48. **(Withdrawn)** The method according to claim 17 wherein said adjusting comprises subtracting said first control measurement from said first measurement.